

**United States Senate
Committee on Energy and Natural Resources**

**AN OVERSIGHT HEARING ON AMERICA'S NATURAL GAS SUPPLY
Wednesday, July 26, 2000, 9:30 A.M.
366 Senate Dirksen Building**

Witness Name and Title

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The Honorable T. J. Glauthier
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The Honorable David Hayes
Deputy Secretary, Department of the Interior, Washington, DC

Mr. Chairman, thank you for the opportunity to testify on the issue of America's natural gas supply. My remarks today will focus on the efforts of the Department of the Interior to ensure that we enhance our nation's future natural gas supplies. However, first I would like to discuss some of our efforts with respect to enhancing our domestic energy supplies in general.

As you are aware, the Administration believes that the best interest of the American people and the oil and gas industry is served by a balanced policy consisting of promoting exploration and development where appropriate, protecting our natural heritage, and fostering the development of conservation and alternative energy sources. In that regard, the Administration is supportive of the U.S. domestic oil and gas industry. We have supported efforts to increase oil and natural gas recovery in the deep waters of the Gulf of Mexico; we have conducted a number of extremely successful, environmentally sound off-shore oil and gas lease sales; and we have opened the National Petroleum Reserve-Alaska (NPR-A) to environmentally responsible oil and gas development, where an estimated 10 tcf of recoverable natural gas resources lie in the northeast section of the reserve.

The Department of the Interior administers the leasing program for both onshore and offshore Federal lands. While domestic production of oil overall has gone down since 1989 largely due to the price of oil on the world market, production on Federal and Indian lands has increased and, as of 1999, accounted for 25 percent of domestic production, up from 13 percent in 1992. We have seen great successes on the Outer Continental Shelf (OCS) and have implemented policies to encourage continued production of onshore wells on Federal lands. For example with respect to the OCS, the OCS Oil and Gas Leasing Program for 1997 to 2002 is the first step in the process to ensure a reliable supply of domestic oil and natural gas resources. And the statistics from the program are impressive --

- The combination of technological advances and legislative incentives like the Deep Water Royalty Relief Act (DWRRA) caused leasing in the Gulf of Mexico to increase almost ten fold between 1992 and 1997.
- From 1993 to 1999, 6,538 new leases were issued covering approximately 35 million acres of the OCS.
- More than 40 million acres of Federal OCS are currently under lease. Approximately 94% of the existing OCS leases (7,900) are in the Gulf, and about 1,500 of these leases are producing.
- Lease Sale 175 in the Central Gulf of Mexico, held on March 15, 2000, offered 4,203 blocks (22.29 million acres) for lease. We received 469 bids on 344 blocks. 334 leases were awarded with \$292,771,205 in high bids going to the Treasury. It was the ninth OCS lease sale held subject to the DWRRA.
- On August 23, 2000, the Minerals Management Service (MMS) is scheduled to hold Sale 177. This will be the fifth OCS sale in the Western GOM (offshore Texas and in deeper waters offshore Louisiana), and the tenth sale overall, in which blocks receiving bids in water depths of 200 meters or more are eligible for consideration under provisions of the DWRRA. Of the 3,789 available blocks encompassing about 20.61 million acres in the Western GOM OCS Planning Area, 2,152 blocks in water depths greater than 200 meters.

- The proposed Eastern Gulf of Mexico sale (Sale 181, December 2001) recognizes the high potential for the development of the significant natural gas resources in the area and the potential for an extension of deepwater development.
- We are currently examining incentives authorized under the Deep Water Royalty Relief Act to ensure continued development of deepwater resources.

However, our efforts have not been confined to Federal offshore resources. The Bureau of Land Management (BLM) has taken a number of actions to encourage production on Federal onshore leases as well. Since 1993, BLM has:

- Issued over 28,000 leases and approved over 15,000 permits to drill.
- Completed an integrated activity plan/environmental impact statement for the northeast portion of the NPR-A. In 1999, the BLM held a lease sale offering 425 tracts on 3.9 million acres -- the first such sale for the reserve since 1984. Oil companies paid more than \$104 million in bids for the high potential oil and gas area.
- Implemented legislation changing competitive lease term from 5 years to 10 years, allowing lessees greater flexibility in exploration without endangering the lease.
- Concentrated its efforts on areas of greatest potential. Accordingly, BLM expects to process more than 1000 applications for permits to drill in the Powder River Basin this year.
- Refocused its planning efforts to meet industry's exploration and production demands.
- Reassessed and revamped its planning documents will provide greater certainty of access while reducing economic risks and potential for litigation. The revised BLM Planning Efforts will include rewriting its planning guidance to prescribe how stipulations will be determined and refocusing its efforts on ensuring quality, certainty and timeliness.

Our policies also have sought to provide economic relief to Federal onshore operators who have suffered during prolonged periods of low oil prices. BLM has provided royalty rate reductions for operators producing heavy crude to offset high costs of production. BLM also has provided royalty rate reductions for operators of stripper oil properties (leases producing less than 15 barrels per day) to provide an economic incentive to keep these properties in production. In 1998, a team representing BLM, MMS and DOE completed a study and recommended continuation of the program.

In addition, BLM and the Forest Service agreed to use one bond to cover liabilities for operations on Forest Service lands, eliminating the requirement that operators buy separate bonding for BLM and the Forest Service. At the same time, the agency has taken steps to protect sensitive areas and resources from inappropriate activities, resulting in a policy that has balanced the nation's need for energy with a clean environment.

We are proud of the Department's accomplishments in this area during the past 8 years, however, these efforts were pursued not only to address current needs, but also to set the stage to ensure that Federal lands will play an important role in meeting the nation's future energy needs.

Certainly natural gas will be a critical component of meeting those needs. Presently natural gas provides nearly a quarter of the Nation's energy needs. The Energy Information Agency (EIA), National Petroleum

Council (NPC), Gas Research Institute (GRI), and others forecast significant increases in future domestic gas demand—to as much as 29 trillion cubic feet (tcf) by 2010. The primary impetus for this dramatic increase in demand is the restructuring of electricity markets and the growing concerns regarding the potentially adverse impacts of burning other fossil fuels. The electricity-generating sector accounts for almost 50 percent of the projected increase in demand. Daniel Yergin and Thomas Robinson of Cambridge Energy Research Associates noted in a recent Washington Post article (July 21, 2000) the increasingly complex linkage existing between the electric power and natural gas industries. They observe that currently 15 percent of our current electric generating capacity is fired by natural gas. However, almost 95 percent of proposed new generating capacity will be gas-fired.

Currently, the U.S. is nearly entirely self-sufficient in meeting an annual domestic demand for 22 tcf. Federal lands have played a large role in helping meet our needs. The OCS currently accounts for more than 26 percent of domestic natural gas production, with the Gulf of Mexico OCS producing, on average, over 5.1 tcf of natural gas per year. Further, we have seen nearly a 60 percent increase in the production of natural gas on Federal onshore lands over the past 7 years—from 1.3 tcf in 1992 to 2.0 tcf in 1999.

However, despite these impressive statistics, it is clear the Nation and the natural gas industry face a daunting supply challenge. The depressed product prices of 1997 through early 1999 have resulted in a decline in domestic gas production capacity. Investments necessary for developing new gas supplies slowed dramatically in 1998 and 1999. Continued investment is critical to maintaining, let alone expanding production capacity. For example, nearly one-third of current Gulf of Mexico OCS production comes from completions less than one year old—emphasizing that historical levels of activity must be maintained to even sustain present production levels. The OCS has not been immune to these market forces. During recent years, natural gas production from the mature shallow waters of the Gulf of Mexico shelf, the backbone of this gas-producing province has declined at an annual rate of 60 billion cubic feet (bcf) per year. During this same period, however, production from the deepwater slope has increased by an average of 77 bcf per year, more than offsetting the decline of the shelf. In 1999, deepwater production increased over 1998 levels by 350 bcf, reaching a total of 1 tcf.

More recently, natural gas prices have rebounded, and most analysts believe they will remain strong. By nearly all accounts the gas resource base of the United States and Canada is enormous. Higher price forecasts should stimulate increased investment in natural gas projects. The latest analyses by NPC, GRI and MMS, while differing in the details, all forecast significant increases in gas production from the Gulf of Mexico. The consensus is that for the early part of the century the Gulf of Mexico will represent the single largest source of incremental gas supply in North America.

GRI and MMS (aggressive case) each forecast Gulf of Mexico natural gas production in 2010 at approximately 6.7 tcf per year, with about 2.5 tcf of that production coming from the deeper water slope discoveries. Neither organization believes production levels from the Gulf of Mexico shelf will collapse, but instead expect the area to remain a focus of considerable industry activity for the next decade or more. The deepwater discoveries, however, form the cornerstone of the anticipated production gain, increasing from the current level of 1 tcf per year to about 2.5 tcf. NPC, on the other hand, predicts Gulf of Mexico production will reach 8.1 tcf in 2010, with 4.5 tcf coming from deepwater areas. Their forecast incorporates a marked decrease from the current volume of gas production from the shallow-water shelf.

Keys to meeting these forecasts are natural gas prices that generate revenues sufficient for new investment and the continued emergence of new exploration and production technologies necessary to overcome the challenges posed by the emerging deep water frontier and a declining quality in the available resource base in a mature producing areas such as the Gulf of Mexico shelf.

As a multiple use management agency, the BLM is tasked with balancing the varied demands for public land usage with conserving the all of resources for the American public. We are working diligently with the National Petroleum Council's task force to address industry concerns regarding access to natural gas, particularly in the Rocky Mountain region. The BLM has and will continue to make land available for leasing and assure that the least restrictive stipulations are applied to achieve maximum allowable development on public lands. Accordingly, we anticipate and, in several instances, industry is already experiencing, extensive development in a number of areas with known gas reserves.

As indicated in the National Petroleum Council study, advancing technology in exploration and production will play an integral role in meeting the growing demand for natural gas in this country. Evidence of the critical role of technology is demonstrated by the exploding production of coalbed methane. Only ten short years ago, coalbed methane was vented into the atmosphere as useless byproduct of more lucrative coal production. However, emerging technology has transformed this gas into a viable energy source. Much of the increase in production is seen in the Powder River Basin of Wyoming and the southern portion of Montana.

Estimates of recoverable gas reserves on public lands from this basin alone are as high as six to nine trillion cubic feet. If maximum operating capacity of the current pipelines in the Powder River Basin is achieved, production could be as much as 1 billion cubic feet per day. That will produce enough fuel to heat nearly fifty thousand homes in the United States for twenty years. Industry is producing the gas and submitting applications for permits to drill at an unprecedented rate and, presently, there are more than 4,000 coalbed methane wells in the basin. Upon completion of further environmental analysis, we expect to more than double that amount. We have requested additional planning funds to address the increasing demand for this resource.

This concludes my written testimony. However, I would be pleased to answer any questions you or Members of the Committee might have at this time.

The Honorable T. J. Glauthier
Deputy Secretary, Department of Energy, Washington, DC

Mr. Chairman and Members of the Committee:

By anyone's account, it has been a remarkable quarter century for natural gas in this country.

In the mid-1970s, natural gas was thought to be a declining fuel. Outdated and counter-productive pricing regulations had handcuffed the industry, stifling exploration and production, and conveying the false impression that the Nation's gas supply was on the wane.

Today, the picture is decidedly different. Far from being a dying resource, natural gas is being counted on to fuel much of America's economic expansion for well into the 21st century. The onerous regulations of the 1970s have been replaced by a restructured and highly competitive gas market, and the industry has responded.

In 1992 the National Petroleum Council conducted a major study of the natural gas potential within the United States. The Council, as many Members of the Committee are aware, is an industry advisory panel to the Department. It has some of the top leaders in the oil and gas industry as its members. Its studies are often cited as the definitive view of the industry by those who know the industry the best. The Council's 1992 study concluded that the United States had about 1,300 trillion cubic feet of natural gas resources outside of Alaska.

This past December, the Council issued an update of the 1992 study requested by the Secretary of Energy. The new analysis found that – despite the fact that Americans consumed 124 trillion cubic feet of natural gas since the 1992 study – the estimate of the Nation's gas resource has actually *increased*. It now stands at more than 1,466 trillion cubic feet.

Advances in technology have opened new frontiers, and new production tools have led to more gas being extracted from both newly discovered and older fields.

The Council's study boosted confidence in the future of gas supplies, but it also raised cautions. The Council stressed that adequacy in the ground does not automatically translate into adequacy at the burnertip. There will be challenges to overcome.

For one thing, gas demand is growing faster than virtually anyone predicted. When one looks back at the forecasts made by the Council just 8 years ago, even its most robust expectations for growth in gas demand have been exceeded by what has actually occurred.

The U.S. economy is growing faster than anyone expected. Environmental regulations that favor natural gas consumption are more firmly in place than in 1992 and are becoming increasingly stringent.

Power companies are looking at the quickest, lowest capital cost options to install new generating capacity. In fact, more than half of the growth in demand for natural gas over the next 20 years will come from the electric generation market. The Energy Information Administration's *Annual Energy Outlook 2000* projects that of the 1000 new power plants likely to be built in the United States in the next 20 years, 900 of them will likely be fueled by natural gas.

Overall, the use of natural gas in this country could increase by more than a third in the next 20 years. In the electric power generation industry, demand for natural gas for power generation could increase by as much as 250 percent.

New technologies are clearly spurring the use of more natural gas. Universities and large conference centers – such as Opryland in Nashville and the McCormick Center in Chicago – are now turning to highly efficient combined cooling, heat and power systems fueled by natural gas.

The Brookfield Zoo in suburban Chicago now has an onsite natural gas cogeneration system, installed in 1998. A Walgreen's drug store in Chesterton, Indiana, became an energy pacesetter last year when it installed a natural gas "microturbine," about the size of a commercial refrigerator.

In New York's Central Park, the park's only police station is now powered by a natural gas fuel cell. Its installation saved the costs of running a very expensive underground transmission line through the Park.

And lest we overlook some of the traditional uses of natural gas, it is important to point out that natural gas is now the fuel of choice for 70 percent of new single family homes.

Natural Gas Prices – Relatively High Now, But Moderating Over Longer-Term

This year the average wellhead price of natural gas is likely to average more than \$3.00 per thousand cubic feet, higher in nominal terms than any time on record (in constant dollars, prices are the highest since 1985). Spot market prices have reached into the \$4.00-\$4.50 per thousand cubic foot range, although they have declined recently to the \$3.70-\$3.80 range.

We expect prices to remain relatively high at least through the summer and perhaps into this winter. This could result in higher consumer heating bills compared to recent years.

Sharp increases in demand, especially in the electric generation sector, coming on the heels of several years of relatively slow exploration and drilling activity (brought about by prior low prices) have created a somewhat tight supply situation. However, the Energy Information Administration (EIA) is projecting that if gas injections continue at historically average rates through the remainder of the refill season, gas inventories would be within the normal range, about 4 percent below the 5-year average.

Drilling has rebounded, and supply will eventually catch up to consumption. Wellhead gas prices are projected to return to more typical levels by next spring. Over the longer term, as the Energy Information Administration testimony describes in more detail, wellhead prices are expected to drop back to the \$2.70-\$2.80 per thousand cubic foot range (in 1998 dollars) or perhaps lower if improved exploration and production technology is introduced at a more rapid pace.

The 30 TCF Gas Economy – Not "If" But "When"

All of this points toward continued growth in gas use.

The Energy Information Administration projects that by 2015, annual consumption for natural gas will reach almost 30 trillion cubic feet (tcf) -- up from today's 21 tcf. By 2020, consumption is likely to continue to rise to almost 32 tcf.

The National Petroleum Council forecasts that we could reach the 30 tcf mark sooner, perhaps shortly after the year 2010, and that in two cases, consumption could be as high as 33 tcf by 2015.

The American Gas Foundation published a recent study, conducted by former Deputy Energy Secretary Bill Martin, that describes a scenario in which gas consumption in 2020 could be 60 percent higher than today – reaching more than 34 tcf. Some forecasters have estimated that if greenhouse gas controls are enacted, demand for natural gas could approach 40 tcf by 2020, nearly doubling today's consumption.

On the other side, there are preliminary indications that structural and efficiency gains in the economy may reduce the projected growth rate for natural gas compared to conventional forecasts. If true, this will tend to

strengthen the industry's ability to deliver needed gas supplies. Either way, this underscores the validity of the Administration's efforts to address issues of both supply and efficiency in consumption.

Can the Gas Industry Deliver? A Sense of Cautious Optimism

These are extraordinary forecasts for a fuel that was virtually given up on in the 1970s. The Energy Department agrees with the National Petroleum Council and others that there is good reason for optimism within the Nation's gas industry.

As the testimony of the EIA shows, this level of growth is not unprecedented, and is about half the rate of growth in the industry from 1955 to 1970. There are challenges, however, as the National Petroleum Council has pointed out. The gas industry will require almost \$1.5 trillion (1998 dollars) in private sector financing through 2015, more than half for new capital investments to find, produce, and transport natural gas. To connect the anticipated 15 million new gas consumers in the next 15 years, more than 255,000 miles of distribution pipelines (27% more than exist today) and 38,000 miles of new transmission lines (a 14% increase) will be needed. The number of wells drilled each year will have to double, and the number of available drill rigs will have to increase by 60 percent. Thousands of new workers will also be needed.

Regarding the need for new pipelines, with the support of this Administration, the Federal Energy Regulatory Commission has adopted a policy statement that increased the flexibility of the provisions it uses to evaluate pipeline projects. The policy statement confirmed that the Commission will begin its environmental review at the time an application is filed. Environmental and economic reviews will continue to proceed concurrently. In cooperation with the gas industry, we have been looking into ways to expedite permit decisions, and other ways to share information more rapidly with state and local jurisdictions that also want input to the process.

Much of the Nation's gas resource resides on federal lands or in federal waters. Two of the most promising regions for future gas production are the Rocky Mountains and the Gulf of Mexico. Most of this gas is available to development now. For instance, over 60 percent of Rocky Mountain gas is open to unrestricted exploration. We have begun several efforts that could help provide even greater access. The National Petroleum Council recommended that an Interagency Working Group be established at the White House to deal specifically with natural gas issues, including access. I am pleased to report that this group has been formed under the leadership of the National Economic Council, and the first staff level meeting occurred last week. Even before the Working Group's formation, the Administration was working on several issues of interest to the industry. For example:

DOE, the Bureau of Land Management (BLM), the Forest Service, the Environmental Protection Agency, the Fish and Wildlife Service, the National Park Service, and the Bureau of Indian Affairs have joined to develop ways to streamline the environmental review processes that must be conducted before drilling on federal lands in the Rocky Mountain region can occur.

We have joined with the Wyoming State Geological Survey, the Wyoming Oil and Gas Conservation Commission, and several federal agencies to develop a science-based regional assessment of oil and gas resources throughout the State. This assessment, which crosses over ownership boundaries, will be available for use in future resource development.

We're working jointly with BLM to develop technologies that are particularly applicable to oil and gas production on federal lands. In the past, this has included air quality monitoring in Wyoming and land remediation in Oklahoma. This year, we will be conducting coalbed methane research in Colorado and Wyoming, analyzing compressor noise on wildlife in New Mexico, studying the effects of oil and gas activities on wildlife in Wyoming, and developing a model for predicting cultural resources in Nevada.

This Administration also has continued to stress energy efficiency in consumption. For example, working closely with industry, we recently announced the deployment of a gas turbine that is the first to top the 60 percent efficiency threshold — the "four minute mile" of turbine technology. When the Energy Department began its advanced turbine development program in the early 1990s, the best turbines available had efficiencies of about 50 percent. This 20% improvement in efficiency means that, if we could replace all of our natural gas generators tomorrow with similar equipment, we could save 400 billion cubic feet of gas per year.

Given these kinds of results, we feel that, by continuing to work hand in hand with industry, the development of larger and stronger natural gas infrastructure within our growing economy is well within our grasp.

The Promise – and Necessity – of New Technology

Advanced technology – from both a production and an environmental standpoint – will be one of the most critical factors in determining whether natural gas achieves its full potential.

As the Energy Information Administration points out, rapid technology development could translate into as much as 2.7 trillion cubic feet of additional gas produced domestically in the U.S. by 2015 compared to a slow rate of technology development (or 1.25 trillion cubic feet of additional gas compared to the "business as usual" reference case). The price impact could be even more dramatic – the wellhead price of natural gas could be as much as 44 percent cheaper by 2015 if the pace of technology development is rapid compared to the slow technology case (or nearly 20 percent cheaper compared to the reference case).

One of the points stressed by the National Petroleum Council was the remarkable progress in technology that was not fully anticipated in 1992. Three-dimensional seismic technology now allows producers to spot small hydrocarbon accumulations that would have been bypassed just a few years ago.

New time-lapse reservoir modeling – or as it is commonly called, 4-D seismic – coupled with other imaging technology now allows producers to "see" reservoir events, such as a gas cap enlarging as oil is produced. In the future, real-time reservoir modeling will use these techniques to allow drilling and field decisions to be made more rapidly, on-the-spot, to maximize production.

If gas is to achieve its full potential, tomorrow's gas producers will have to drill deeper, faster, and smarter. The Department of Energy helped pioneer the polycrystalline diamond drill bit, the measurement-while drilling technology, the "thru-casing" logging system, and several other innovations that have allowed the hydrocarbon industry to probe deeper into more hostile environments searching for natural gas.

But if tomorrow's producers are to keep pace with the steadily growing demand for natural gas, even more impressive innovations will be needed. The drilling systems of the future will likely need to be "smart systems," incorporating rugged integrated circuitry to monitor conditions at the drill bit, analyze for hydrocarbons in "real time," and steer the bit through rock that is deeper and denser than has ever been encountered before.

Recently, for example, new gas research projects were selected to determine the feasibility of using a laser to drill natural gas wells, to improve a novel "down-hole hammer" which uses the power of the drilling fluid to help drive a drill bit into a gas-bearing formation, and to develop an ultra-lightweight cement that could help lower the costs of completing natural gas wells.

A little over a year ago in southwestern Wyoming, in a project we helped cosponsor, Union Pacific Resources drilled a 17,000 foot deep well with a 1,700-foot horizontal section – one of the longest horizontal wells drilled into the tight sand formations of the Rocky Mountains. Production was far above expectations, and that has led to additional privately funded horizontal wells in the same Green River formation.

This project is especially important because onshore production from nonconventional formations – like the Rocky Mountain tight sands – is likely to increase significantly over the next 10 years. By 2015, as much as a quarter of the natural gas we produce in the United States could be coming from unconventional gas reservoirs.

The offshore Gulf of Mexico is another prime area for increased gas production. New technology now allows producers access to gas supplies in ocean waters more than a mile deep, and exploration wells are now being completed in over 8,000 feet of water. Exploration in this deep water can be attributed to this Administration's support. By granting deepwater royalty relief, the Administration has accelerated, perhaps by years, the development of deepwater technologies and the rate at which these deeper formations have come into production.

In the even longer term, there may be the potential for tapping the enormous energy potential of methane hydrates beneath the ocean floors or the Arctic tundra – but that may require technologies we can only imagine today.

The Potential for "White Crude" from Remote Gas Sources

In Alaska's far North Slope, there are vast natural gas resources that in the past have been unmarketable because there was no cost-effective means for transporting the fuel in gaseous form. Recently, as natural gas demand and prices have increased, several companies have begun reevaluating the economic potential of new pipeline projects to transport North Slope gas to North American consumers. Ultimately, market economics and environmental considerations will dictate which, if any, of the competing pipeline projects will proceed.

Our role at the Energy Department is to help assure that all technological options are available for tapping the potential of North Slope gas. One of these options is to use the gas as the chemical "building blocks" for synthesizing liquid fuels.

In liquid form – or as it has been called, "white crude" – the natural gas from the North Slope could keep the TransAlaska Pipeline System (TAPS) flowing well beyond its currently projected economic lifetime and supply liquid fuels that could help the U.S. reduce its dependence on imported crude oil.

Two years of research in our gas-to-liquids program is now reaching the point where several classes of ceramic membranes and seal materials have been proven suitable for chemically converting natural gas into gases that could be recombined into liquid fuels. Cost savings of up to 30 percent over conventional gas separation processes appears to be within reach. In FY 2001, a prototype membrane unit capable of processing 24,000 cubic feet per day of syngas (equivalent to 0.75 barrels per day) will be built and tested. Design and engineering will be started on an even larger, 500,000 cubic-foot-per-day unit (equivalent to 15 barrels per day).

A New Initiative in Infrastructure

Tomorrow's research partnerships must also extend beyond just the gas field itself. For the first time, in our fiscal year 2001 budget, the Energy Department included a funding request for significant research into the infrastructure of future gas delivery.

Pipeline and local distribution companies will continue to rely on the development of advanced technology for reducing operation and maintenance costs. There will need to be research to reduce stress corrosion and cracking in gas transmission and distribution lines. There will be a need for smarter, automated, inside-the-pipe inspection systems that can not only sense weak points but repair them. There will be a need to develop portable optical imaging technology to detect natural gas leaks in pipelines, storage and processing facilities. There will be a need for new technologies that can expand storage capacity near market centers to meet peak demand periods.

The Strategic Center for Natural Gas

But it's not just a question of the dollars we are spending – but whether we are spending them in the most efficient manner to address the right issues.

Three different parts of the Department are responsible for spending the \$200-plus million dollars we direct annually at natural gas-related research and development. But until recently, there was no single focal point to coordinate those efforts or to determine if there were gaps in the Energy Department's natural gas portfolio.

I'm pleased to report that this has changed. Last December, Secretary Richardson announced his intent to create a new Strategic Center for Natural Gas as part of our new National Energy Technology Laboratory in Morgantown, West Virginia, and Pittsburgh, Pennsylvania. In March, the Center became operational.

Its mission is to work with the Nation's gas producers and users, to set the course for future gas policies and programs, and to help ensure that this country has the technological capability to meet tomorrow's demands for natural gas.

The Center will perform four key functions:

- ***Spearhead annual DOE-wide gas RD&D planning and program assessment.*** The Gas Center will work closely with other DOE offices to develop an integrated Natural Gas Strategic Plan that will establish high-level budget and policy priorities for all natural gas programs within the Department. The Center will also provide support to individual program offices for detailed natural gas road-mapping activities in each market sector to provide a consistency of approach. In addition, the Center will identify gas in the Department's natural gas programs and work closely with other policy and planning activities to establish appropriate government-industry partnerships to fill priority research and analytical needs.
- ***Provide science and technology advances through the Laboratory's on-site programs.*** Through in-house research at the National Energy Technology Laboratory, the Center will provide cutting-edge science and technology for the clean, efficient production and use of natural gas. For example, the Gas Energy Systems Dynamics Focus Area is developing the basic science to understand the unsteady processes of natural gas combustion and conversion in advanced energy technologies, such as fuel cells, combustion turbines, and coupled turbine-fuel cell systems. Other onsite research areas to be emphasized by the Gas Center include computational analyses of advanced turbine and fuel cell components, methane hydrates, and the geologic sequestration of greenhouse gases.
- ***Shape, fund, and manage extramural research and development.*** A major activity of the Gas Center will be to manage gas-related contracts and grants with U.S. industry, universities, and other national laboratories. The Gas Center will form an alliance with the National Renewable Energy Laboratory (NREL) to provide for the complementary implementation of a complete portfolio of gas and other energy technologies.
- ***Conduct studies to support policy development.*** The Gas Center will develop and use analytical tools to assess natural gas policy options. This will be done in conjunction with DOE's headquarters program offices, the Office of Policy, and the Energy Information Administration.

Conclusion

It took us a quarter century to realize the true extent of the domestic energy treasure we have beneath us in the form of natural gas. Now, we must understand and take on the challenges if the full value of that treasure is to be realized over the next quarter century.

Advances in technology do not happen overnight – nor do they happen in a vacuum. Both industry and government are going to have to work hard to keep the technology moving forward.

The growing dominance of independent producers in this country, many already strapped for cash, will create new challenges for R&D investments. The phase out of the R&D tariffs that supported the technology efforts of the Gas Research Institute will be another important factor.

If gas is to live up to its expectations, the need to fill these funding gaps – the need to leverage funding in research partnerships, including partnerships with the Federal government – will become increasingly important. The Administration has learned the hard lessons of the 1970s where excessive regulation of the market caused more problems than it solved. We have a strong record of supporting natural gas, and are confident that working in partnership with industry, natural gas will play an important part in America's energy future.

This completes my prepared statement. I will be pleased to answer any questions Committee members may have.

Mary Hutzler
Director, Integrated Analysis and Forecasting, Energy Information Agency,
Department of Energy, Washington, DC

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to appear before you today to discuss the views of the Energy Information Administration (EIA) on prospects for natural gas supply.

EIA is an independent statistical and analytical agency within the Department of Energy. We are charged with providing objective, timely, and relevant data, analysis, and projections for the use of the Energy Department, other agencies, the Congress, and the public. We do not take positions on policy issues, but we do produce data and analysis reports that are meant to help policy makers decide energy policy. Because we have an element of statutory independence with respect to the analyses that we publish, the views are strictly those of EIA. We do not speak for the Department, nor for any particular point of view with respect to energy policy, and our views should not be construed as representing those of the Department or the Administration.

Today's analysis is based on EIA's Annual Energy Outlook, which provides projections and analysis of domestic energy consumption, supply, prices, and carbon emissions through 2020. These projections are not meant to be exact predictions of the future but represent a likely future, assuming known trends in demographics and technology improvements, and also assuming no change in current law, regulation, and policy. EIA does not propose, advocate, or speculate on changes in laws and regulations. So, one of our key assumptions is that all current laws and regulations remain as they are at the time the projections are made. This means, for example, that none of the provisions of F.E.R.C.'s Order 637 (to improve efficiency in the gas transportation marketplace and protect captive customers from abuses of market power) are assumed in these projections, because, although some elements of the Order were proposed, it did not become an official ruling until February, 2000. Similarly, while state-level electric utility restructuring will probably occur throughout most of the country, we only represent it for States that have actually put restructuring plans in place because implementation plans vary.

History of Natural Gas Supply

The highest recorded U.S. annual consumption of natural gas--22.1 trillion cubic feet (tcf)--occurred a generation ago in 1972 (Figure 1). As close as the Nation came in 1996 and 1997 (within 0.5 percent), the record has yet to be broken. The 1972 peak was followed by a decline to a low of 16.2 tcf in 1986, when the downward trend reversed.

What caused natural gas consumption to fall off as sharply as it did between the early 1970's and the mid 1980's, and subsequently almost return to its previous high? The primary reason was heavy regulation of virtually every aspect of the market. Producers were constrained by price controls and end-users were constrained by moratoria placed on the construction of new gas-burning units. The market was unable to send clear signals about the consumers' interest in purchasing and the suppliers' willingness to sell.

Regulations on the price of interstate gas sales were set by the Federal Power Commission (FPC) in the mid 1950's, creating a two-tier market in which interstate gas was regulated and intrastate gas was not. The price ceilings for interstate gas that were set kept prices artificially low, and by the late 1960's prices for intrastate gas began to exceed prices for gas destined for the interstate market. The low prices led to increased demand, but discouraged production, with the exception of what could be sold in the unregulated intrastate market. Shortages of gas that resulted led to industrial sector curtailments in the early 1970's, and, during the extremely cold winter of 1976 to 1977, to curtailments for both the industrial and utility sectors. Many were convinced that the shortages would increase, focusing attention on the issue of supply reliability which was to

plague the industry for more than a decade. To help remedy the situation, Congress in 1978 passed the Natural Gas Policy Act (NGPA), the objective of which was to provide a phased decontrol of natural gas wellhead prices. The NGPA placed wellhead price caps on several categories of natural gas, which had escalation factors developed to allow them to rise to a level competitive with other fuels. Rather than remedying the situation, the complexities of the NGPA increased the problem. The escalation clauses were developed under the assumption that oil prices would continue to rise steeply. Price caps for the categories of gas subject to these escalators grew to be priced considerably above, rather than below, the market. These high prices spurred exploration and development. This resulted in high reserve additions, while at the same time the high prices were having a dampening effect on demand. By the early 1980's, the shortage of natural gas had been replaced with a surplus, often referred to as the "gas bubble." A spot market for gas developed, with spot gas priced below contract gas. Because pipelines were allowed to pass gas costs through to consumers, they had little incentive to try to get access to this lower-priced gas, so average prices to consumers remained above spot prices.

At this point, the Federal Energy Regulatory Commission (FERC), successor to the FPC, intervened with a series of Orders that removed gas costs from minimum bills (Order 380, in 1984), required that pipelines provide open access to transportation services (Order 436, in 1985), and eventually, with Order 636 in 1992, allowed for a major restructuring of interstate pipeline operations. This led to open competition in the industry and a much healthier market that is controlled by supply and demand rather than through heavy regulation. The market has grown steadily since 1986. While there was once speculation as to whether the market would eventually reach 30 tcf, it's now generally viewed as a question of when and how--not if--a 30 tcf market will be achieved.

Growing Natural Gas Supply

In 1999, U.S. natural gas consumption was more than 21 tcf and accounted for 23 percent of domestic energy consumption. Gas consumption is expected to grow 1.8 percent annually from 1998 to 2020--faster than any other major fuel source, mainly because of the growth in gas-fired electricity generation. Demand is projected to reach almost 30 tcf in 2015 and continue to rise to almost 32 tcf in 2020. Gas consumption by electricity generators is expected to increase more than two and one half times (compared to current levels), while modest growth is projected in all of the other sectors. As demand increases, pressure on natural gas supply will grow. These demand-side pressures will begin to raise questions like: "Is there enough gas to meet demand at affordable prices?" and "Can we produce the gas fast enough to keep up with demand?"

Even with this projected production increase, technically-recoverable natural gas resources in North America are believed to be adequate to sustain growing production volumes throughout the forecast period without dramatic price increases. (Advances in technology are included in the forecast and current high prices are expected to decline, as discussed below.) Domestic gas production is expected to increase a bit more slowly than consumption over the forecast, rising from 18.7 tcf in 1998 to 25 tcf in 2015, with the difference made up by increased imports. Growing production reflects generally rising wellhead prices, relatively abundant natural gas resources, and improvements in technologies, particularly for producing offshore and unconventional gas.

Net imports are expected to rise to make up the difference between domestic production and consumption, and they are generally expected to be priced competitively relative to domestic sources (Figure 2). Net imports are expected to climb from 3.1 tcf in 1998 to 4.9 tcf in 2015--somewhat faster than the growth in overall consumption, accounting for 16 percent of total consumption in 2015.

Most of the increase is attributable to imports from Canada, primarily from western Canada, although some new gas is also expected from Sable Island in the offshore Atlantic (Figure 3). Canadian resources are adequate to sustain production for many years. The Canadian Gas Potential Committee indicates that there is

an estimated 184 tcf of marketable discovered and undiscovered natural gas in the Western Canada Sedimentary Basin.

In addition, interest in developing the MacKenzie Delta/Beaufort Sea region of the Northwest Territories has recently begun to increase. The Canadian National Energy Board estimates the undiscovered marketable potential for natural gas in the region at 55 tcf. With most Canadian oil- and gas-producing regions less mature than those in the United States, the potential for additional low-cost production is strong, and imports from Canada are projected to remain competitive with U.S. domestic supplies in the forecast.

Mexico also has a considerable natural gas resource base, but gas trade with Mexico is expected to consist primarily of exports. Conversion of power plants from heavy fuel oil to natural gas, in compliance with Mexico's environmental regulations, is expected to gain momentum and it is unlikely that indigenous natural gas production can be increased enough to satisfy rising demand.

LNG provides another source of gas imports; however, given the projected relatively low natural gas prices in the lower-48 markets, LNG is expected to supply just 0.33 tcf, or 1 percent of U.S. gas consumption in 2015. LNG imports in the future could rise above the forecast given the opening of the currently mothballed facilities at Cove Point, Maryland and/or Elba Island, Georgia. Total available import capacity including these facilities is 0.84 tcf, so LNG is not expected to become a major source of supply in the forecast period.

Growing Domestic Production

To satisfy a 30 tcf market in 2015, annual domestic natural gas production will need to increase by 6.2 tcf (Figure 4). Thus, over the next 17 years production increases must average about 360 billion cubic feet (bcf) per year. From 1955 to 1972, the industry increased production at twice this rate. Of course, conditions are different from what they were in those earlier years. Undiscovered field sizes in mature producing areas are smaller, and larger prospects are located in more remote areas. On the other hand, the average real price of natural gas in 1999 was more than three times higher than it was in 1955, real exploration and production costs are lower, technology is significantly more advanced, and the regulatory environment is much more favorable to gas production.

Current estimates of technically-recoverable natural gas resources indicate that the resource base is expected to be adequate to sustain growing production volumes for many years, based primarily on the assessments done by the U.S. Geological Survey for onshore regions and by the Minerals Management Service for offshore areas. As of January 1, 1998, technically recoverable resources were 1,259 tcf (Figure 5). Resources include not only proved reserves, which were 167 tcf, but inferred reserves from known fields, undiscovered conventional resources from new fields, and undeveloped resources of unconventional gas. Inferred reserves, representing the expected growth from previously discovered fields, totaled 223 tcf, most of that located in onshore areas. Conventionally recoverable resources in lower-48 undiscovered fields not associated with oil deposits accounted for 356 tcf of the total. Undeveloped resources of unconventional gas from tight sands formations, coalbeds, and shales total 378 tcf. Gas associated with oil makes up most of the balance of the total technically recoverable resource base.

Reserves are anticipated to be more than adequate throughout most of the forecast period. Although falling prices in 1998 caused production to exceed reserve additions, rising prices in the forecast after 2003 are projected to cause reserve additions generally to exceed production until close to the end of the forecast period, even with the expected increases in demand. This leads to a growth in end-of-year reserves throughout much of the forecast period (Figure 6). Relatively high levels of annual reserve additions through 2015 reflect increased exploratory and developmental drilling as a result of higher prices, as well as productivity gains from technology improvements.

Uncertainty with regard to estimates of the Nation's natural gas resources has always been an issue in projecting production, and could affect production and prices. The uncertainty surrounding recoverable gas resource estimates is reflected in the differing views on the subject. For example, an April 1998 study by the Gas Research Institute (GRI), contending that the industry has "significantly underestimated" the growth potential of existing fields in the Midcontinent, onshore Gulf Coast, East Texas, and San Juan Basin areas, proposes higher resource estimates for those areas.

Over the forecast period, increased U.S. natural gas production comes primarily from lower-48 onshore conventional nonassociated sources (Figure 7). Conventional onshore production accounted for 35 percent of total U.S. domestic production in 1998 and is expected to increase to 40 percent in 2015. Offshore production, mainly from wells in the Gulf of Mexico, also rises. Innovative, cost-saving technology and large oil and gas finds, particularly in the deep waters of the Gulf, have encouraged interest in this area. Much of the gas production in deep waters is expected to be associated with oil wells. Lower-48 offshore Gulf Coast production was 5.6 tcf in 1998—a little lower than the previous year, because of lower prices. Rocky Mountain (primarily unconventional sources) and onshore Gulf of Mexico regions account for just over half of the incremental production needed between 1998 to 2015, as improvements in technologies continue. Increased production from the offshore Gulf Coast and onshore Southwest regions account for almost a third of the total increase in the same period. Although offshore Gulf Coast production grows in the projections, picking up after 2001 as a result of further deepwater exploration and development, production from the offshore Gulf of Mexico is constrained by depletion effects.

Pipeline and Transportation Issues

With the significant increase in annual production projected for the Rocky Mountain and Gulf Coast onshore production regions between 1998 and 2015—1.57 and 1.64 tcf, respectively--- considerable pipeline expansion will be required (Figure 8). For the Rocky Mountain region, an area that has long experienced bottlenecks in pipeline capacity that have prevented full use of its production capacity, the additional projected production represents a 54 percent increase from 1998 levels.

Much of the forecasted expansion is either already in progress or scheduled to be completed within the next two years. Several pipeline projects recently completed will provide producers in the Rocky Mountain region with new access to customers in the Midwest. KN Interstate's new Pony Express project and the Trailblazer system expansion provide access from the Wyoming and Montana production regions, and Transwestern Pipeline and El Paso Natural Gas expansions have increased the capacity to move supplies out of New Mexico's San Juan Basin. Transwestern also expanded its Gallup, New Mexico, compressor station which further increased its capacity. The completion last year of a large scale gathering system in the Powder River Basin significantly increased access to supplies, as did the Frontrunner intrastate expansion. To utilize the new gathering system, both Wyoming Interstate and Colorado Interstate pipelines increased their capacity. Along with increases in capacity, significant increases in flows from the region to markets on the east and west coasts are expected between 1998 and 2015.

There has been considerable pipeline expansion in the Gulf Coast offshore region area, but much of it is for gathering systems and short-haul pipelines to move supplies onshore, rather than major interstate pipeline expansions. The greatest recent increase in pipeline capacity has been to increase import capacity between the United States and Western Canada. Capacity almost doubled between 1990 and 1998, with the major expansion being the Northern Border expansion through Montana into the Midwest. Other major expansions are the Alliance Pipeline, also providing access to Western Canada, and the Maritime and Northeast system to transport Sable Island supplies to markets in New England.

Natural Gas Drilling Activity

One of the key activities in producing natural gas is drilling. With prices providing an economic incentive and generally declining drilling costs, successful lower-48 natural gas well completions are expected to reach 16,200 in 2015. This level of drilling is below the level reached in 1981 of more than 20,000 successful gas wells, but represents approximately a 54 percent increase over 1998 levels.

Although the number of available drilling rigs has been generally declining since 1982, price increases are a powerful incentive for increased drilling and the purchase of new drilling equipment. The number of available drilling rigs increased by almost 16 percent annually between 1974 and 1982--from 1,767 to 5,644--as natural gas prices more than quadrupled in real terms and oil prices more than doubled. The rigs needed over the forecast period are assumed to be constructed, with the total rig count projected to increase from 1,705 in 1998 to 2,053 in 2015. The increase in rigs is tempered by the fact that technological improvements make it possible to drill faster and thus individual rigs can be more productive than in the past. Given the historical response to prices, even prices below current levels are likely to provide sufficient incentive for the needed drilling rigs available.

The U.S. natural gas rig count on June 30 was a record high of 718 rigs, and exploration and production budgets for many natural gas producers are reportedly expected to increase in the latter part of 2000 and into 2001, spurred by the incentive of higher prices. Although the effects of increased drilling for gas will probably not appear in the form of increased production until after the next heating season, overall, the natural gas industry is thought to be in a position to meet the supply requirements for a market of 30 tcf, with adequate supplies available from numerous sources at the prices projected in the AEO2000 reference case. As long as the industry can be assured that the demand will be there, the economic incentive of a competitive market will assure that the necessary investments in infrastructure, rigs, drilling, and manpower will be made over time.

Natural Gas Prices

According to EIA's Short-Term Energy Outlook, the average wellhead price for natural gas is expected to average \$3.03 per thousand cubic feet in 2000 (in 1998 dollars). In nominal terms, this represents the highest annual wellhead price on record; in real (inflation-adjusted) terms, this projected price would be the highest annual average price since 1985. Over the past 2 months, natural gas prices in the spot market have averaged over \$4.00 per thousand cubic feet, though over the past week they have fallen below this figure to the \$3.70 to \$3.80 per thousand cubic feet range. Although EIA believes these higher prices will not remain in the long-term, a break from higher natural gas wellhead prices may not develop until next spring. Several years of relatively low prices have slowed down exploration and drilling for new sources of supply. Recent higher prices have caused drilling to rebound, but new domestic supplies are not likely to augment production until after the next heating season. Given the assumption that the current price regime will generate greater success by Canadian suppliers in filling new export capacity on the Alliance pipeline, we expect higher net imports to help alleviate the tight supply situation. Hot summer weather in portions of the country that consume large amounts of gas-generated electricity has contributed to a low storage injection rate. Natural gas that would normally be injected into storage has, to some extent, been used (indirectly through electric generators) to run air conditioners. EIA anticipates that prices will be high through the summer and into the winter, as gas demand growth for electric generation is projected to remain high through 2000.

Further adding to the situation, several new gas-fired power plants are expected to come on line this summer, and many plants that were previously used for peaking only are now serving as baseload generators, causing an increase in overall natural gas demand. Underground storage levels are currently 19 percent below year-ago levels, putting upward pressure on the price as we enter the time of year in which injections into storage usually occur. However, average daily net injections in the first two weeks of July were 24 percent above the 5-year (1995-1999) average for the month and 59 percent ahead of last year's rate. If injections continue at

historically average rates through the remainder of the refill season, gas inventories would be 2,856 billion cubic feet on November 1, which is 4 percent below the 5-year (1995-1999) average of 2,985 billion cubic feet.

Concerns regarding possible high summer demand in conjunction with the relatively low level of storage had been putting upward pressure on price. Until recently, high prices appear to have been discouraging a higher rate of storage injections. For the remainder of this year at least, it is clear that the overall domestic supply situation remains tight and prices will be above what were previously expected. Producers are expected to increase production to meet the demand increases, but this cannot be done overnight. Thus, while prices are expected to remain higher than last year for the short-term, over the longer term we anticipate that they will move downward before beginning to rise again reaching \$2.81 per thousand cubic feet (1998 dollars) in 2020 in the AEO reference case.

Technological Development

Technology improvements have both reduced effective exploration and development costs, and increased the recoverability of in-place resources. Major advances in data acquisition, data processing, and the use of technology to display and integrate seismic data with other geologic data--combined with lower cost computer power and experience gained using new techniques--have exerted downward pressure on costs. One significant cost-saving technology, adopted in the later part of the 1980s, was horizontal drilling. Drilling a horizontal, as opposed to a conventional vertical well, enables more of the reservoir to be exposed to the wellbore since most reservoirs are wider than they are deep. Another substantial boost to successful exploration and development has come from the increased use of three dimensional seismology to more effectively delineate prospective areas of a formation. Additionally, the introduction of subsea well technologies, tension leg platforms, and production spars have opened up vast new and promising areas for exploration in the deepwater areas of the offshore that had been inaccessible. The AEO reference case assumes that improvements in technology will continue at historical rates. To assess the potential effects of faster and slower rates of improvement, rapid and slow technology cases are also examined, with the same resource base as in the reference case. Rapid technology improvements could yield benefits in the form of both lower prices and increased production to meet higher consumption requirements.

Production from unconventional gas resources (tight sands, shales, and coalbeds), an increasingly important source of supply, is responsive to changes in the assumed levels of technological progress. Whereas the reference case projects total U.S. natural gas production in 2015 at 25.0 tcf, the rapid technology case projects 26.3 tcf of production in 2015, with the increase coming primarily from offshore and unconventional sources (Figure 9). More significantly, this higher production is available at lower prices, reflecting the lower costs and higher efficiencies that result from increased technological gains. In the slow technology case, prices are higher than in the reference case, and production in 2015 only reaches 23.6 tcf.

Offshore gas production in the Gulf of Mexico is expected to grow from 5.5 tcf in 1998 to a peak of 6.7 tcf in 2015 in the reference case and 5.9 tcf in the slow technology case. In the rapid technology case, however, offshore Gulf of Mexico production exceeds this peak, growing to 7.5 tcf in 2015, and cumulative offshore production between 1998 and 2015 is 109.9 tcf, compared with 104.5 tcf in the reference case and 98.9 tcf in the slow technology case. The rapid technology assumption has a similar, but less dramatic, effect on unconventional gas recovery (UGR). Cumulative UGR production between 1998 and 2015 is 96.3 tcf in the rapid technology case, compared with 93.7 tcf in the reference case and 90.6 tcf in the slow technology case. Virtually all of the increase in cumulative total production in the high technology case over the reference case comes from UGR and offshore production. In the slow technology case, the drop in production from UGR and offshore sources exceeds the drop in total cumulative production by slightly over 6 tcf. Changes in production in the alternative technology cases reflect the benefits of lower costs and higher finding rates for conventionally recoverable gas, as well as an array of technological enhancements for unconventional gas recovery.

The natural gas price projections are highly sensitive to changes in assumptions about technological progress. Reference case wellhead prices for natural gas in the lower-48 States are projected to increase on average by 1.7 percent a year from 1998 to 2020 reaching \$2.81 per thousand cubic feet in 1998 dollars (Figure 10). The increase reflects rising demand for natural gas and the impact of the progression of discoveries from larger and more profitable fields to smaller, less economical ones. Lower-48 wellhead prices increase at an average annual rate of 3.0 percent in the slow technology case, compared with 0.6 percent in the rapid technology case, over the projection period. In the rapid technology case, average natural gas wellhead prices are projected to reach \$2.23 in 2015, which is \$0.48 less than the reference case price. These relatively large differences in price among cases arise because substantial shifts in supply result from the variance in technological progress, under conditions of moderate demand responsiveness.

Summary

Overall, the natural gas industry is expected to be in a position to meet the supply requirements for a 30 tcf market, with adequate supplies available from numerous sources at competitive prices. While recent high natural gas prices resulting from the tight supply situation will most likely continue for the short-term, over the longer term EIA anticipates that they will move downward before beginning a rise along the lines forecast in the AEO Reference case. Technology improvements that have occurred since the 1970's have both reduced effective exploration and development costs and increased the recoverability of in-place resources. Improvements are expected to continue, which will make it possible to produce more of the resource base.

Much of the pipeline expansion needed to meet a 30 tcf market is either already completed or scheduled to be completed within the next two years. Several new expansions provide producers in the Rocky Mountain region with access to customers in the Midwest, and recent Gulf Coast area projects have provided gathering systems and short-haul pipelines to access new supplies. These are the two areas of the country from which most of the incremental production is forecast to come. Expansion of capacity between the United States and Canada has significantly increased, providing greater access to Western Canadian supplies and new access to Sable Island supplies.

G. Warfield "Skip" Hobbs
President, Division of Professional Affairs, American Association of Petroleum Geologists, New
Canaan, CT

Thank you, Mr. Chairman. My name is G. Warfield "Skip" Hobbs. I am an independent petroleum geologist from New Canaan, Connecticut. I am also President of the Division of Professional Affairs of the American Association of Petroleum Geologists (AAPG), an international professional organization composed of more than 29,000 geologists, including 22,000 petroleum geologists in the United States. We are the scientists whose job it is to find the oil and natural gas, coal and other energy mineral resources that our nation depends on to fuel its economy.

The AAPG, founded in Tulsa, Oklahoma in 1917, was chartered to serve the geoscience profession through the identification and application of new science and technology for the discovery and production of hydrocarbon resources. The application of new exploration and development concepts and technologies has led to more efficient practices that have lowered the cost of produced energy, and significantly reduced the environmental consequences of energy production. The membership of AAPG is proud of their contributions in supplying the world with reliable and inexpensive energy, in developing new ways to do that job better, and in the education of new geoscientists to carry on the tradition.

I would also like to note that the AAPG is affiliated with the American Geological Institute. The AGI is an umbrella organization headquartered in Alexandria, Virginia that represents over 100,000 geoscience professionals. I want to acknowledge their assistance in preparing this testimony.

You did hear me correctly. I am not from Texas, and I do not work for "Big Oil".

I am a bona fide New Englander - raised in Connecticut, and educated at Yale College.

This gives me a slightly different perspective than most oil industry spokesmen.

It is perhaps because I live in New England, at the end of the energy supply line, that I especially welcome the opportunity to testify here this morning.

Why We Have Convened Today

This hearing has been convened to address an issue that directly impacts the continued economic well being and security of the United States.

Natural gas presently supplies about 25% of the nation's domestic energy requirements. Last year, gas consumption in the United States was approximately 22 Trillion cubic feet (TCF). According to the Department of Energy Information Agency (EIA), proven domestic gas reserves as of December 31, 1999 were 164 trillion cubic feet (TCF). At a consumption rate of 22 TCF/year, proved reserves represent only a 7.4-year supply. Gas demand is skyrocketing, particularly as a "clean" fuel for electric power generation. Recent studies by the EIA, Gas Research Institute, and the National Petroleum Council (NPC), indicate annual demand will grow to as much as 32 TCF over the next 15 to 20 years. In its 1999 study, the National Petroleum Council projected annual demand to reach 29 TCF as early as 2010. At 32 TCF/year consumption, currently proven reserves represent only a five-year supply.

Proven gas reserves in the United States have dropped 43% during the past 30 years, from 290 TCF at year-end 1970, to only 164 TCF now. In a report issued in late May, the EIA forecast that the nation's proved reserves would decline a further 2% during 2000, due to increased demand, and the very low drilling levels of the past few years.

This summer, instead of being injected at a normal seasonal rate into local storage sites in the Northern States for winter use, natural gas is firing electric power plants in the torrid Gulf Coast and Southwest to run air conditioners. Storage levels are well below where they should be this time of year. There may be no margin now for extended cold weather demand, or any significant gas production or deliverability disruption next winter.

The dynamics of the current supply/demand equation for natural gas have resulted in surging natural gas prices. Last year, the average NYMEX spot price at the Henry Hub was \$2.25/MMBTU. This year, the Henry Hub spot market price has soared over \$4.50/MMBTU. The NYMEX 12 and 24-month futures prices indicate that industrial gas consumers and traders alike believe that strong demand will continue to keep pressure on supply for the foreseeable future.

Some market analysts are predicting that a cold winter this year could result in a gas price spike over \$7.00/MMBTU. At current prices, residential gas consumers can expect a \$200 to \$300 increase in their winter gas-heating bill; and some can ill afford that cost.

The public must be made aware of the seriousness of the situation, and prepared for significant price increases and possible regional gas curtailments.

Gas Supply

The Senate Energy Committee's principal question today is, do we have enough natural gas to meet future demand, and where will we get this gas?

As the spokesman for the geologists who assess the nation's fossil fuel resources, I can unequivocally answer in the affirmative. Yes, the United States has abundant natural gas resources to fuel the country well into the 21st Century.

It is my understanding that the Senate Energy Committee has received copies of the most recent resource assessments of the US Geological Survey (USGS), Minerals Management Service (MMS), EIA, and the National Petroleum Council. The AAPG has not made a recent independent natural gas resource assessment of its own. I would like to point out however, that many of the geoscience professionals that prepared the resource reports for the organizations just cited, are members of the AAPG. For example, the Director of the United States Geological Survey, Chip Groat, is a long-standing, and highly respected AAPG member. The AAPG Committee on Resource Evaluation was formed specifically to assist the USGS and MMS in the assessment of the undiscovered oil and gas resources of the United States. Our Resource Committee has recommended and evaluated methodologies, identified experts for each sedimentary basin, and has reviewed the resource estimates of the USGS and MMS.

The 1999 National Petroleum Council (NPC) study concluded that the United States has a remaining gas resource base in the Lower 48 States of 1,466 TCF. It should be noted that only 157 TCF, or just 10% of the identified resource, is considered proven. There are an additional 313 TCF in Alaska; however, this gas is useless without a pipeline to the Lower 48 markets. The total identified USA gas resource, including Alaska, is a whopping 1,779 TCF. Even at 32 TCF/year consumption, there is more than a 50-year supply. Cumulative domestic production over the past hundred plus years is estimated to be about 890 TCF.

Where is the Gas?

There are significant remaining known gas resources in the traditional onshore gas producing areas of the Gulf Coast, West Texas and in the Mid-Continent. However, these areas are now intensely drilled and blanketed with 3-D seismic, and are not yielding the large new discoveries required to replace the nation's

depleting proven gas reserves. Major oil companies and large independents are exiting onshore exploration and moving their operations into the sparsely drilled waters of the Deep Gulf of Mexico, and overseas.

Many small oil and gas companies, and the majority of the independent prospect originators, many of whom are AAPG members, are having trouble finding partners, as well as the capital, to drill the smaller reserve exploratory prospects that remain in the traditional gas producing areas. Higher oil and gas prices have significantly increased the drilling rig count; however, over 90% of the current drilling activity is to develop known reserves.

The AAPG concurs with the 1999 NPC report conclusion that the most prospective areas for major new gas discoveries are on public lands in the Rocky Mountain sedimentary basins, offshore in the Gulf of Mexico, in the Eastern Gulf of Mexico, and on the Atlantic and Pacific OCS. Despite the huge potential of these areas, Federal law presently prohibits exploration on the Atlantic and Pacific OCS, and in the Eastern Gulf of Mexico. Access to much of the remaining resource potential of the Rocky Mountain basins is restricted or closed.

Exhibit 1 is a map from the NPC report that shows the resource potential of the Lower 48 public lands that are closed and/or subject to severe restrictions. The total estimated gas resource of these areas is 213 TCF, or a nine-year supply at current rates of gas consumption. It is likely that with further exploration, these resource figures would increase significantly.

The total area of the U.S. Federal offshore, including Alaska, to the 200-mile economic limit, is about 2 billion acres. Only 2 percent has been leased. In its 1995 study, the Minerals Management Service assessed a mean undiscovered recoverable resource of 46 billion barrels of oil and 268 trillion cubic feet of natural gas in the Federal OCS. This is 2.5 times the offshore reserves found to date.

The NPC map does not include Alaska. In its 1995 National Oil and Gas Assessment of Onshore Federal Lands, the USGS estimated that the Northern Alaska province accounts for more than half of the of the undiscovered conventional gas assessed on onshore Federal lands. As previously stated, Alaska's total gas resources were cited in the NPC report as 313 TCF. This represents a 14-year supply!

There is a huge domestic gas resource, yet access to much of this remaining resource is either closed, or so restricted that development is not economic.

Chevron Corporation, for example, has a 1 TCF dry gas discovery in the Eastern Gulf offshore Florida. The company has been prohibited from developing this giant gas field by federal and Florida State regulators.

Not included in the gas resource figures, is the potential of shallow gas hydrates on the Outer Continental Shelf. Although we do not presently have the technology to recover them, gas hydrates are another major future potential energy resource. In its 1995 assessment of gas hydrate resources for the Atlantic OCS, the USGS estimated a potential resource in the range of 6,000 to over 100,000 TCF. These figures dwarf the NPC conventional resource estimate. Coalbed methane, another unconventional gas resource, which was included in the NPC study, has risen from nil to about 6% of domestic gas supply over the past 15 years. I firmly believe that gas hydrates will, like coal seam methane, also be commercialized, probably within a decade.

The Need to Provide Access to Gas Resources on Public Lands

Natural gas is cited as a cleaner, more environmentally benign, energy resource to fuel our economy. However, the public has not had the will to permit access to the huge gas potential of its undeveloped public lands. Additionally, a federal regulatory maze has been created that discourages domestic petroleum exploration operations and investment.

As a result of more than a decade of US neglect in implementing a comprehensive National Energy Supply Policy, and the environmental protection priority of the public, gas demand has finally caught up with, and probably overtaken, peak demand supply.

This situation cannot be blamed on "Big Oil and Gas", nor the distribution companies.

The United States cannot depend on gas imports from OPEC to meet rising demand. Natural gas is a North American commodity that is locked into a pipeline infrastructure. As much as 14% of supply will come from Canada over the next 15 years. Imports from Mexico will be minimal. The 1999 NPC study projected LNG imports of less than 1% of supply through 2015. Accordingly, the United States must develop its own gas resources to meet future demand. This requires access to the public lands that are deemed most prospective for natural gas.

Conservation and renewable energy resources are cited by the opponents of access to public lands as the solution to our energy requirements. They are out of touch with reality. Energy conservation has been effective in certain areas, particularly in regard to increased mileage per gallon for automotive engines. Nevertheless, demand for transportation fuels continues to rise. Despite DOE expenditures of over \$9 billion since FY 1980 on solar and other renewable energy research, these alternative energy resources still provided only 0.08% of primary energy supply in 1999, exclusive of traditional hydroelectric power (4.5%). Research must continue on alternate energy resources. The fact is, however, that our economy will continue to depend on fossil fuels for the majority of the nation's primary energy requirements for many more decades.

Improving access to natural gas-prospective public lands, is the most practical way to assure that the nation has the natural gas it requires to fuel our economy, and to keep its citizens warm in the winter and cool in the summer.

Environmentally Responsible Resource Development

It is the firm belief of the AAPG that development of the natural gas resources in environmentally sensitive areas of the Rocky Mountains, the North Slope of Alaska, the Eastern Gulf of Mexico, and the Pacific and Atlantic OCS, can be done in an environmentally responsible manner, with no lasting harm.

To illustrate that drilling and production can take place in a safe and environmentally sensitive manner; we can look to the East Coast of Canada. For more than thirty years, offshore exploration, and now production, have calmly co-existed in the Canadian Maritimes with tourism and commercial fishing, in a cooperative, and even supportive environment, for the betterment of all concerned communities. More than 300 exploratory wells have been drilled within the offshore outer continental shelf waters of the Canadian Atlantic. At least 12 trillion cubic feet of natural gas and 2 billion barrels of oil have been discovered so far. More than 125,000 barrels of oil and 400 million cubic feet (MMcf) of natural gas are being produced per day within the prime commercial fishing waters and the pristine tourist coastlines of Eastern Canada. Much of this new gas is now flowing to New England.

There is a major new deep Jurassic Age reef trend discovery offshore Nova Scotia. If successfully delineated, this new field alone could add an additional 400 MMcf/day gas production. Incidentally, a former executive officer of the AAPG, a Canadian, originated the new gas discovery.

Petroleum geologists of the AAPG believe that the same types of oil and gas accumulations that exist in the Eastern Canadian offshore, may extend south along the U.S. Atlantic Coast, from George's Banks to the Carolina Trough, a distance of almost 1,000 miles

The Canadians have also successfully developed and have been producing natural gas from their portion of Lake Erie since the 1950's. The US portion of Lake Erie has a thicker sedimentary section, and would likely be more productive. New Yorkers could use the gas. United States law, however, prohibits exploration in the Great Lakes.

Brazil is successfully exploiting its substantial Atlantic OCS petroleum resources in an environmentally responsible manner. In doing so, it has become the world leader in ultra-deep water production technology.

New technologies also now permit oil and gas development in a way that minimizes onshore surface disruption in environmentally sensitive areas. The British, for example, who are even more fussy about open spaces than we are, agreed to develop the giant Wytch Farm Oil Field under Poole Harbour, smack in the middle of the most heavily visited coastal zone of the South of England. At the Wytch Farm development, long reach deviated wells are drilled in a radial pattern from a camouflaged central well pad onshore, to locations up to seven miles out into scenic Poole Bay.

Opponents to petroleum development cite old operating practices, and prior environmental abuses, that are simply out of touch with modern reality. Just like the Canadians, British, Brazilians, Norwegians, Qataris, Thais, Australians, and many other petroleum producing nations, Americans likewise can develop their offshore and onshore energy resources in environmentally sensitive areas in a safe and rational manner. To believe otherwise is simply inconsistent with what is being done every day all over the world.

As someone who vacations on the New England coast, and loves to sail and fish in Long Island Sound, and in the Gulf of Maine, I have a vested interest in the environmental consequences of petroleum operations in the Atlantic OCS. I can truthfully testify that I have no fears, and am confident that the environmental risks of exploring for oil and gas offshore New England are minimal, and acceptable. Experience in the Gulf of Mexico has demonstrated the best fishing is actually right around the artificial reefs created by offshore oil and gas production platforms.

GAS SUPPLY POLICY RECOMMENDATIONS OF THE AAPG

The petroleum industry can and will be able to provide the gas supplies needed to maintain the economic stability and security of the United States. However, to do so, the nation must address three critical issues. These are:

- 1) Improved access to public lands;
- 2) Reform of the regulatory process; and
- 3) Fairer tax treatment to stimulate capital formation and investment.

1. Public Lands Access

In regard to the public lands access issue, the AAPG recommends the following:

- Lifting of the Moratorium on OCS Exploration and Development in areas where it exists today.
- Opening of the Eastern Gulf and Atlantic Margin OCS to Area-wide Leasing.
- Reform of the Dept. of Interior Policy regarding access to public lands in the Rockies.
- Opening the 1002 Area of the Arctic National Wildlife Refuge to Exploration.
- Amendment of the Federal Antiquities Act to prevent its misuse in restricting access to public lands.
- Balancing the needs of all stakeholders in shaping public lands policy.
- Assurance that there is no net loss of state and private land in creating new land restrictions.

2. Regulatory Reform

Reforms are needed to streamline the federal petroleum regulatory and permitting process to stimulate natural gas exploration and production. Rules and regulations must be based on scientific reality, not on popular environmental misconceptions. The practical economic impact of all regulations must be considered. In this regard, the AAPG recommends the following:

- Reform the Clean Water Act and Endangered Species Acts, especially those sections that pertain to wetlands.

- Reform the procedures used by the Department of the Interior in managing energy resources on public lands in the Rocky Mountain region and elsewhere.
- Limitation of the extensive delays of the permitting process.
- Limitation of the ability of the EPA to regulate drilling muds and hydraulic frac fluids as "hazardous wastes".

3. Tax Reform

The independent petroleum industry has historically drilled over 80% of the nation's oil and gas wells. However, over the past 15 years, low oil and gas prices, changes in the tax code, and the attraction of alternative higher yielding investment opportunities, has resulted in capital starvation for independents. Petroleum exploration and production are extremely capital intensive and high risk. In order to get the independents back to work finding and developing the nation's gas resources; we must stimulate capital formation.

Technology and dot.com stocks have peaked. With high gas prices, investors in New York and elsewhere are now beginning to look for direct investment opportunities in natural gas. However, most non-industry investors are deterred by the liability exposure of a direct working interest in a gas well. They would prefer to be limited partners, and be rewarded through tax benefits for assuming exploration risk to drill for a depleting asset.

The role of taxation is critically important to the development of oil and gas resources. However, the U.S. Tax Code currently contains provisions that serve as major disincentives to petroleum investment. While we currently enjoy significant budget surpluses, Congress can afford to reform the tax code.

The AAPG recommends the following tax reform legislation to stimulate the investment needed to increase domestic natural gas supply.

- Restoration of the write-off of intangible drilling costs for the passive investor. This tax deduction was eliminated by the Tax Reform Act of 1986, and effectively wiped out the major source of drilling capital for small independent oil and gas exploration companies. Billions of dollars of new drilling capital would quickly become available to the industry through restoration of the Intangible Drilling Cost (IDC) tax deduction for passive limited partnership investors.
- Elimination of the onerous Alternative Minimum Tax.
- Allow expensing of delay rentals in the year incurred, not capitalizing them as currently required.
- Allow expensing of geological and geophysical costs in the year when the costs are incurred.
- Make permanent the suspension of the net income limit for percentage depletion on marginal properties.
- Raise the depletion allowance provision to previous levels.

CONCLUSION

The United States has abundant natural gas resources. However, absent access to these resources on public lands, and regulatory relief and tax incentives to stimulate domestic petroleum exploration and development, the nation will face a serious gas supply shortage.

The AAPG recommends that Congress focus its attention on the energy issue without further delay. Presidential candidates also need to respond realistically to the energy crunch, because high prices and supply disruptions will be front-page news in November. Politicians must also realize that kicking the petroleum industry in the shins and shaking fists at OPEC, makes for good press, but is no solution to the pending natural gas supply crunch.

A National Energy Policy that balances the interests of all stakeholders, should be developed and implemented as quickly as possible. If this is not done, and soon, some Americans will truly run the risk of "freezing in the dark". Time is running out! The proverbial "doo doo" is hitting the fan as we speak.

Thank you for giving the American Association of Petroleum Geologists the opportunity to present to the Senate Committee on Energy and Natural Resources, the views of the professionals whose job it is to find the nation's natural gas resources. The full text of the Position Papers of the AAPG on energy supply and public land withdrawal policy are attached as exhibits to this testimony.

Michael L. Johnson
Vice President and General Manager, Conoco Inc., Houston, TX
on behalf of the Natural Gas Supply Association

Thank-you, Mr. Chairman, for this opportunity to discuss the important issue of the way access to producing lands will affect our nation's supply of natural gas as well as America's economy and security over the coming decades. I am Michael Johnson, vice president and general manager of Conoco, Inc.

Conoco is an integrated, international energy company headquartered in Houston, Texas, and is among the top dozen or so U.S. gas producers. The company had revenues of \$27 billion in 1999 and operates in more than 40 countries. Conoco's natural gas and gas products operations include the gathering, processing, distribution, and marketing of natural gas and natural gas liquids in North America, the U.K., Norway and Trinidad. In 1999, Conoco marketed natural gas volumes in excess of 4.4 billion cubic feet per day in the U.S. and Europe.

This year, Conoco is proud to be celebrating its 125th anniversary.

I am also today representing the producers of the Natural Gas Supply Association. NGSA represents integrated and independent companies that produce and market domestic natural gas. Established in 1965, NGSA encourages the use of natural gas and a regulatory climate that fosters competitive markets.

I would like to address four topics in my remarks today:

First, I will talk about the supply of natural gas available to U.S. consumers, businesses, and industries.

Second, I will address the ways supply meets potential demand.

Third, I will talk about the ways that short- and long-term market pressures in our industry are impacting the nation.

Lastly, I will address the ramifications of government policies concerning exploration and production on federally owned land – policies that, if they continue in current directions, have a strong potential to have negative repercussions on fuel markets in the future.

Supply

First, let me address the supply of natural gas.

I want to emphasize producers' optimism about the long-term supply of natural gas.

Today, we supply about 23 percent of the energy America consumes. That's about 19 quadrillion BTUs (or "quads") of domestic gas, and an additional 3 to 4 quads from independent and affiliated companies in Canada.

There is no doubt that, in the future, the U.S. could – if we chose to do so – dramatically increase the amount of natural gas marketed domestically. The resource is there.

There are many estimates of U.S. natural gas supply. All are highly positive. At the request of the Department of Energy, the National Petroleum Council (or "NPC") undertook a study in 1999 that estimates the recoverable natural gas resource base in the Lower-48 states at 1466 trillion cubic feet (or "tcf"). That

estimate is significantly stronger than the estimate the NPC made in 1992. In fact, the new study finds a strong probability of at least 171 tcf more than it found in 1992. That's in addition to the 124 tcf we produced between 1992 and 1999.

The reasons for this growth are the new technologies and new methods of locating resources that the industry has developed and implemented. Our strides in these area are so rapid that we are increasing recoverable resources at rates far faster than we would have predicted just a few years ago.

Part of this expansion of the resource base involves a re-exploration and re-assessment of areas that had been assumed to be in decline, such as California. We are also expanding our reach out of the Lower-48 states to new frontiers such as offshore eastern Canada, where experts predict lie upwards of 45 tcf of natural gas. Western Canada, the Mackenzie Delta and Beaufort Sea, and the North Slope offer additional possibilities, through reservoirs in traditional formations and through our greatly increased ability to tap coal-bed methane.

Tapping into the resources in these frontier areas is not inexpensive. Climate and terrain are frequently hostile. We must constantly balance cost, risk, and potential in an energy market that is frequently unpredictable.

Demand

Despite the risk, however, the robust supply of natural gas makes us confident of our ability to meet market demand. We can, if called on to do so, increase both the volume of natural gas use and the percentage of U.S. energy supplied by gas.

Analysts and experts agree. The most recent Annual Energy Outlook from the Energy Information Administration, for instance, shows natural gas production in 2020 at slightly more than 27 quads and imports at about 5.3 quads. On a consumption basis, the EIA sees natural gas as rising from today's 23 percent to almost 27 percent of our total energy market.

Such an increase would make natural gas the nation's fastest-growing fossil fuel. Over the next two decades, as total U.S. energy consumption grows at a rate of 1.3 percent annually, natural gas markets are likely to expand at a rate of about 1.5 percent. Our most significant increase in demand will be in electric generation. The challenge this growth poses our industry is significant – but I am confident in our ability to develop and supply natural gas to the market.

Industry and Market Evolution

Energy prices are a significant factor in the nation's economic growth. They are therefore of concern to you, as public policy leaders, and to us, as producers.

Over the past year, a number of short-term factors have affected natural gas prices:

The glut of oil on the market in 1998 and 1999 had dramatic negative effects on U.S. oil and gas exploration and drilling. Producers depend on revenue from both oil and gas to balance their costs and provide capital for expansion. When oil prices underwent their drop during that period to historic lows, domestic producers were unable to sustain previous drilling levels. Rigs were idled and employees laid off.

Today, we are recovering from that low point in our industry's history. Drilling has reached unprecedented levels. But the production from those new wells has not yet reached the market. Until it does, prices are likely to remain tight.

A second short-term marketplace factor involves storage capacity and management. Natural gas storage is used in high-consumption areas primarily to respond to winter heating demands, and analysts closely

monitor storage injections throughout the summer to gauge the adequacy of gas supply for the following winter.

The Energy Information Administration tells us that storage injections are currently within normal ranges. However, some analysts, seeing the currently rising demand projections for natural gas, are speculating that current injections are too low to meet likely demand this coming winter. The storage-injection factor appears likely to affect our marketplace especially strongly in the next few months.

Weather is also a factor in near-term gas markets. The increasing use of natural gas for electricity generation has created high demand levels during heat waves. Similarly, current forecasts of an upcoming winter with normal temperatures – in other words, temperatures lower than those of the past two winters – create expectations of increased demand.

There are also a number of longer-term factors affecting natural gas markets, including the following:

Natural gas demand projections are rising above expectations of a few years ago, as previously explained.

At the same time, we're finding that reservoirs in some areas, such as the Western Gulf of Mexico, deplete more rapidly than originally projected. That puts additional pressure on our capital budgets.

The entire energy industry is changing and becoming more competitive, primarily as a result of the restructuring of wholesale and retail markets in natural gas and electricity.

New technologies like distributive power are giving residential and business customers new options and changing traditional energy-use patterns.

As a result of this longer-term evolution of the industry, companies have faced unexpected new competitors; resource supplies have, in various instances, come on-line faster or slower than expected; and new applications for natural gas have created competition for existing supplies.

Such sweeping changes have made it difficult at times for U.S. companies to predict revenue streams accurately and to plan capital investments. That creates some wariness on Wall Street about investments in our industry. Some of our companies have, as a consequence, had difficulty raising the capital required to expand exploration and production. We can see the effects in industry stock prices and in the wave of worldwide corporate consolidations over the past two years.

In the long run, the natural gas industry is evolving in ways that are helping us recover from the aftermath of low drilling rates during 1998 and 1999. Market forces are working. While we must communicate expectations accurately to American families and businesses, to help them plan their own energy use, it is important not to over-react – as the United States did, for instance, during the Carter era – with unwise national policies that result in restricted supplies and unnecessarily volatile prices.

The Policy Climate and Access to Resources

In most ways, the natural gas marketplace has evolved into a commodity market. And because of difficulties in transporting natural gas in ways other than pipelines, the most important single factor affecting the health of that marketplace is producers' ability to access the nation's domestic gas resources and bring them to consumers.

As we look at the future, I and my fellow producers are deeply troubled by the issue that is the primary subject of today's hearing: federal policies that restrict producer access to the nation's natural gas resources – resources in the Lower 48 States, as well as resources in Alaska.

As I have explained here today, there is no question that the U.S. has vast natural gas resources and that our producers have the technical and financial ability, as well as the goal, to bring these resources to market. That information does not, however, answer the question: Will producers be able to bring these resources to market? Specifically, will the policies of the U.S. government cause vitally needed resources to remain unproduced? Will Americans be forced to turn to energy sources other than domestically produced natural gas to fill their needs?

Today, there are some in positions of power who want it both ways. They want the nation to use more domestic natural gas as one solution to air quality problems. At the same time, they object to our producing it. They are endorsing a position that locks up increasing amounts of land – to prohibit natural gas exploration and production in our richest resource areas, both on- and off-shore.

America's richest natural gas resources – the resources we can produce most cost-effectively – lie under onshore and offshore federal lands. Our industry can produce this gas in ways that are environmentally sensitive, and we are committed to that goal. Advances in our industry have reduced the impact of gas production on the environment. And dozens of environmentally sensitive technologies are being employed by the industry.

Yet, we hear constantly from a number of highly placed federal policymakers who oppose domestic natural gas production and transport. Such opposition is in no one's best interest.

To the contrary, it is in all of our best interests to ensure that Americans have access to the energy they need at the lowest possible cost – low-cost in terms of price, and low-cost in terms of environmental impact. Domestic natural gas production is the ideal way to meet those conditions.

Thus, Mr. Chairman, denying access to public lands can only lead to two consequences – fuel switching, to the extent that is possible, and higher energy costs for future generations. We do not think either of those choices are good alternatives. It is time to change directions before damage is done to the U.S. economy.

Conclusion

In conclusion, natural gas decontrol has served consumers and this Nation admirably. One only need to look at natural gas prices since 1989 to assess the benefits that have been shared by various natural gas users.

Mr. Chairman, lessons from the past have taught us not to rely on any one fuel. While I am here today representing natural gas producers, I am at the same time keenly aware that the nation relies on a host of energy sources. We cannot permit any of them – especially natural gas – to be undermined through thoughtless federal policies.

Thus I ask for your continuing efforts to fashion a balanced energy policy that is based on fact, not fiction, and that includes natural gas as an important tool toward our common economic and security goals.

Paul Kelly
Senior Vice President, Rowan Companies, Inc., Houston, TX
on behalf the National Petroleum Council

Testimony not available

Matthew R. Simmons
President, Simmons & Company International, Houston, TX

Mr. Chairman, members of the Committee:

I am Matthew Simmons, President of Houston based Simmons & Company International, an energy specialist investment banking firm. I am also a past Chairman of the National Ocean Industries Association and a member of the National Petroleum Council. I served as the Demand Task Force Chairman of the NPC's recent report entitled Meeting the Challenges of the Nation's Natural Gas Demand.

I understand that your committee has already held hearings to review the demand estimates from both this NPC study and similar reports. All estimates point to strong demand growth.

But I would like to begin my remarks by issuing an alert that the current natural gas demand estimates laid out in the NPC report might have grossly underestimated the inherent demand. Given the explosive growth in planned new gas-fired electricity generating plants, a 28 to 30-tcf market for U.S. natural gas demand could arrive in half the time envisioned by the NPC report.

Should this high demand come much sooner than 2010, there is little way for this much new supply to be added so fast. In fact, some extremely knowledgeable industry executives and analysts privately worry that the ambitious goals of reaching 29 to 30 tcf of natural gas supply by 2010 might be a real stretch, even if all access and other regulatory issues are cleared away. The decline curves for too many basins around the country are so high, and still rising, that it takes an increasing amount of drilling to simply keep the current production base flat.

The prime reason for possibly underestimating the demand for natural gas was misjudging the rapid growth in orders for new gas-fired turbines. This has caught virtually everyone, including the manufacturers of these efficient electricity-manufacturing units, by surprise.

All of this points to the high degree of confusion that currently exists about the state of the U.S. electricity market. There is confusion about the current growth in kilowatt demand. There is confusion about the extent of excess capacity that still exists in coal-fired electricity generating plants. There is confusion on how many of the gas-fired plants now on order are merely double bookings and confusion whether these new plants will be used only during peak hours of summer heat or used to simply replace less efficient older gas fired plants. Finally, there is confusion on the extent to which these new gas-fired plants will be built as dual fuel plants (so they can use distillate oil as a substitute if natural gas supply is limited) or if the price too high.

There is a solid case to be made that electricity demand has been growing almost 50% faster than the EIA/Edison Electric Institute has recorded, due to the fast growth in non-utility generated electricity. And a strong case can also be made that all forms of alternate power generation have now begun to reach 100% utilization for most of the year during the 16 hours per day when electricity is consumed. From the research our firm has done, few of the new gas-fired plants on order are planning for any significant amount of dual fuel use.

If electricity demand continues to grow, and there is some solid evidence the New Economy is now accelerating electricity growth, many of the gas-fired plants on order will be forced to operate for longer periods of time than a few peak hours in the summer.

When all these changed assumptions are calculated into a revised demand model, the 30-tcf gas needs could jump ahead by half a decade.

As these new gas fired plants get hooked up, the reliability of the North American gas storage system could also be called into question. A case can be made that America could start to see gas withdrawal from our storage system during the summer months as early as next year or the following year at the latest, as the massive amount of new gas-fired plants come on stream. The dynamics of such a scenario require either a major increase in daily gas production during the shoulder months or we risk literally draining the natural gas storage system over the course of one to three years of winter and summer storage withdrawal.

With little or no storage, natural gas would then need to be relegated to a seasonal use or major end-users would need to find other sources of energy.

In the short to medium term, this energy conundrum can only be solved by a rapid increase in drilling activity. This requires access to areas like the eastern part of the Gulf of Mexico and the Rockies. But it also probably requires a significant number of new land and offshore rigs to be built and a way to attract significant numbers of new people added to the industry's employment base.

Getting any of this done will take longer than most think, given the still fragile nature of the drilling industry and petroleum equipment supplies. The periodic downsizing of these sectors and the tiny amount of new assets and people added over almost 20 years have taken a real toll on the industry's ability to expand.

In summary, the natural gas industry faces some stiff challenges. Not only is the demand growth real, it could be significantly understated. If the natural gas industry cannot meet these insatiable demand needs, it leaves our electricity system with little way to expand until either new coal fired plants are built, new nuclear plants are added, new dams built, or major increases in imported NGL which require new offloading terminals. All this will take the better part of a decade to accomplish.